"Angela DeDolph"
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To

Subject ECC Attachment Z-1

04/05/2007 08:44 AM

Matt,

Attached is a draft of Attachment Z-1 for your review and approval. The text has been provided in a redline format to highlight the changes since the October 2006 version of the text and also in a clean version. As discussed, Attachment Z-1 has been simplified and also updated to incorporate the work done at the site to date and changes reflected in the February 2007 design, including the utilization of SVE trenches (based on the results of the pump tests), the elimination of a settling bed for the PRGS and the utilization of direct discharge standards supplied by IDEM for the resulting discharge into Unnamed Ditch, and the division of Phase II long term monitoring into a Phase II(a) and Phase II(b). Specifically, we would like to highlight the following additions/deletions:

1. Footnotes 2, 6, 10, and 13 were removed. Footnote 2 was removed in response to comments received from Tom Krueger. Footnote 6 was removed because it is redundant (see Footnote 5). Footnote 10 was removed in response to comments received from Tom Krueger. Footnote 13 was removed because the Acceptable Subsurface Water Concentrations have been removed from the Attachment Z-1 tables since the PRGS discharge will be measured by the IDEM supplied effluent limits and nothing else remains in the design to which the subsurface water criteria apply (see discussion of table edits below for more details). Please note that in the text that is in redline/strikeout, the footnotes have not been renumbered, but they are automatically renumbered in the clean version.

2. Table Z-1-1 was edited, a new Table Z-1-4 was added, and the former Table Z-1-4 has been renumbered Z-1-5. Table Z-1-1 was revised to remove the Acceptable Subsurface Water Concentrations and all related footnotes and references. Attachment Z-1-1 no longer contains any requirements for data to be compared to the Acceptable Subsurface Water Concentrations. Rather the majority of the data at the site are going to be compared to the Acceptable Stream Concentrations as discussed in greater detail in Attachment Z-1. A new table was added that summarizes the PRGS Effluent Limits and numbered Table Z-1-4. This table was added because based on design changes and the draft February 2007 Design Report, the PRGS effluent data will be compared to these Effluent Limits rather than the Acceptable Stream Concentrations. The former Table Z-1-4 (renumbered to Table Z-1-5) contains the proposed schedule. The schedule has been updated to reflect the recent submittal of the draft February 2007 Design Report.

3. Figures 3, 4, and 5 have been deleted, and the former Figure 6 has been renumbered Figure 3. Figures 3, 4, and 5 contain design details that are included in the Design Report; therefore, they have been removed from this Attachment Z-1.

4. Appendices A, B, C, and D have been removed; Tables E-1 and E-3 have been removed; and Tables E-2 and E-4 have been renamed Tables A-1 and A-2, and are now renamed Appendix A. The former Appendix A contained a description of the soil vapor and water treatment system. A detailed description of the soil vapor and water treatment system has been included in the Design Report. The former Appendix B contained a copy of the Construction Completion Report for the thin barrier curtain wall. This report has previously been submitted, and will be included as an attachment to the next version of the Design Report. The former Appendix C contained a copy of the Field Sampling Plans, which are included as Appendix C of the Design Report. The former Appendix D contained copies of the equations, equation parameters/exposure assumptions, and human health toxicity parameters in the IDEM RISK Technical Guide – Appendix 1 (January 1, 2004 update) that were used to calculate the Site-Specific Soil Exposure Limits in Table Z-1-2. These equations, equation parameters/exposure assumptions, and human health toxicity parameters will be included as an attachment to the next version of the Design Report. The former Appendix E contained four tables used to evaluated background conditions in the subsurface water and surface water. The two tables related to subsurface water (formerly Tables E-1 and E-3) have been removed because the Acceptable Subsurface Water Concentrations have been removed from Table

Z-1-1. The two tables related to surface water (formerly Tables E-1 and E-3) and used for determining the Acceptable Surface Water Concentrations have been renumbered Tables A-1 and A-2 and placed in the new Appendix A.

I hope that the above clarifies the changes that are proposed for Attachment Z-1. If you have any questions or comments, please let Environ and the Trustees know.

Thank you.

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Attachment Z-1 - April 2007 redline.pdf


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ATTACHMENT Z-1

ENVIRO-CHEM SUPERFUND SITE
ZIONSVILLE, INDIANA

Submitted to:

U.S. Environmental Protection Agency, Region 5
And
Indiana Department of Environmental Management

Submitted by:

ENVIRON International Corporation
Deerfield, Illinois

On behalf of:

The ECC Site Trustees

April 2007

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CONTENTS

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TABLES

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CONTENTS
(continued)

FIGURES

APPENDICES

Deleted: Augmented SVE Trench System Profile View

Deleted: Figure 4: Augmented SVE Trench Typical Section¶
Figure 5: Typical PVC Riser Pipe – Augmented SVE Trench¶
Figure 6: Surface and Subsurface Water Sampling Locations¶

Deleted: Soil Vapor and Water *Treatment System*

Deleted: Appendix B: Thin Barrier Curtain Wall

Deleted: Figure B-1: Proposed Thin Barrier Curtain Wall Location – Plan View¶
Figure B-2: Thin Barrier Curtain Wall – Profile View¶
Figure B-3: Thin Barrier Curtain Wall Typical Section¶
Appendix C: Sampling Plans¶
Appendix D: IDEM RISC Default Equations and Parameters¶
Appendix E: Statistical Evaluation of Background Conditions¶

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1.0 INTRODUCTION

As presently configured, the soil vapor extraction (SVE) system that has been installed at the Enviro-Chem Superfund Site ("ECC" or "Site") has not achieved the subsurface water cleanup standards in the till set forth in Table 3-1 to Revised Exhibit A, United States Environmental Protection Agency (USEPA) and Indiana Department of Environmental Management (IDEM) are concerned that failure to achieve those cleanup standards may, over time, have an adverse effect on water quality in Unnamed Ditch, which is located adjacent to the eastern portion of the Site. For that reason, Revised Exhibit A, the Consent Decree, and the amended ROD provide for specific Additional Work to be performed if USEPA determines that those standards were not met within a five-year period, unless the parties agree otherwise.

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These standards were not met within the five-year period provided in the Consent Decree, and this attachment describes agreed modifications to the "Additional Work" provisions of the Consent Decree. In particular, the existing SVE system will be augmented by additional SVE trenches generally along the alignment of a ground water collection trench previously required in Revised Exhibit A to the Consent Decree for "Additional Work." The new SVE trenches will be connected to the existing SVE system and will be operated using all of the basic operations of the existing SVE system. In order to provide additional protection to Unnamed Ditch, a thin barrier curtain wall with a reactive gate has been constructed. The work required under Attachment Z-1 enhances and replaces the water interception trench originally required as the Additional Work in Revised Exhibit A and all Attachment Z-1 work will be conducted under the Additional Work provisions of the Consent Decree, as amended.

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The design and construction of the remedy set forth in this Attachment Z-1 will be performed in two phases. The first phase, which included the installation of the thin barrier curtain wall along the east, south, and southwest sides of the ECC Site has been completed, as agreed to by the parties and approved by the Court on February 2, 2006. The associated piezometers have also been installed and till water pump tests at existing wells have also been completed. The till water pump tests were performed to: (1) determine whether it is practical to dewater the augmented SVE trench system, particularly the trench segments at the former Southern Concrete Pad area;[1] and (2)

Deleted: and associated piezometers

Deleted: and till water pump tests at existing wells,

[1] Augmented SVE Trench Segments 5 and 6, as presently proposed in this Attachment Z-1, are located at the southern end of the Site in the area of the former southern concrete pad. A pump test was also conducted in the northern portion of the site, where soil vapor extraction was conducted, and confirmed that excess water does not occur in that area.

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obtain data necessary to complete the design, including the design of the permeable reactive gate system (PRGS).

The pump tests have confirmed that the SVE trench system is practical in all areas, particularly in the former Southern Concrete Pad area. The pump tests have also provided the data necessary to complete the design. A detailed design was submitted in February 2007 as the *Design Report for the Attachment Z-1 Remedy* (the "February 2007 draft Design Report"), to be reviewed and approved by USEPA, in consultation with IDEM, as provided in the Consent Decree. A schedule for remedy construction is discussed in Section 6.0 of this Attachment Z-1 and will be modified as needed in the final design subject to approval by USEPA in consultation with IDEM.

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After completion of construction, there will be several distinct phases for the operation of the modified Additional Work. The activities will be different for each period. The periods and the associated activities are as follows:

A. Active Phase: This is defined as the period of operation of the augmented SVE trench system.

B. Phase I Monitoring: This is defined as the 1-year period beginning when the Soil Vapor Standards have been achieved in the augmented SVE trenches. At the completion of the Phase I Monitoring period, Phase II Long-Term Monitoring will begin at the Site.

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C. Phase II Long-Term Monitoring: This is defined as the period following the completion of Phase I Monitoring.

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2.0 AUGMENTATION OF SVE SYSTEM – REMEDIAL ACTIONS

The primary objective of the modified Additional Work is to treat subsurface water and soil contamination in the vicinity of the augmented SVE trench system and prevent off-site migration of contaminated subsurface water to Unnamed Ditch.

The sequence of activities for implementing the modified Additional Work is presented below.

- Installation of a thin barrier curtain wall along the east, south, and southwest sides of the ECC Site adjacent to and near the outside edge of the trenches.
- Perform till water pump tests at three existing wells (T-1, HS-1, and HS-2).
- Evaluate pump test data and complete design for augmented SVE trench system.
- Installation of SVE trenches along the east, south, and southwest sides of the ECC Site.
- Collection and treatment of subsurface water in the till and extraction of soil vapors via the augmented SVE trench system until attainment of Soil Vapor Standards.
- Monitoring of surface and subsurface water.
- Control of the Site hydraulic gradient within the till unit and further assurance of protection of Unnamed Ditch from the discharge of contamination above Effluent Limits provided by IDEM Office of Waste Management in February 1997 using a PRGS.

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Modified Additional Work activities, including the surface and subsurface water monitoring, are discussed in more detail in the following sections.

2.1 Well Abandonment

Some of the wells that have the potential for interference with the construction or operation of the augmented SVE trench system were abandoned in September 2005. The abandonment activities are described in greater detail in the *Report of Well Abandonment Activities* letter dated January 12, 2006. Well S-4A was abandoned and will be replaced by well S-4B.[3] The S-4B well will be installed following the construction of the

Deleted: The wells that were abandoned are T-6, T-7, T-8, T-9, S-2, S-3, MW13, HT-1, CDW-1, CDW-2,[2] and piezometer P-1. In addition, w

[3] Construction related activities conducted at the ECC Site during 1998 and 1999 may have damaged monitoring well S-4A. As a result, a new well (S-4B) will be installed approximately 50 feet to the south (downgradient) of S-4A in a low-traffic area to be agreed on by the parties.

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augmented SVE trench system, during the installation of the S-5 well. Figure 1 shows the locations of the wells that were abandoned.

Four additional wells will be abandoned prior to the construction of the augmented SVE trench system. These wells (i.e., HS-1, HS-1A, HS-2, and IW-5) were not abandoned in September 2005 because they were used for the till water pump tests. The locations of these wells are shown on Figure 1.

Deleted: Within 30 days of the completion of the abandonment, the Indiana Department of Natural Resources – Division of Water was notified in writing of the identification and location of the wells, and the procedures followed during the abandonment. A copy of the notification was forwarded to USEPA and IDEM with the *Report of Well Abandonment Activities* letter dated January 12, 2006. ¶
¶

2.2 Augmented SVE Trench System

The augmented SVE trench system will be used for SVE treatment of the shallow till along the east, south, and southwest sides of the Site. The existing SVE system will be augmented by additional trenches and the new trenches will be connected to the existing SVE system and will be operated using the nine basic operations of the existing SVE system. The nine basic operations are as follows:

1. Aeration and equalization of "raw water" within tank T-2.
2. Transfer of the water to the treatment building using influent feed pumps.
3. Filtration of the influent water using total suspended solids (TSS) filters.
4. Treatment using counter-current tray aeration air stripper.
5. Combining the air stripper "off-gas" with the SVE "air header pipe."
6. Absorption of organics in the combined air stream using granular activated carbon prior to release to the atmosphere.
7. Filtration of air stripper effluent water through additional TSS filters.
8. Absorption of residual organics in the filtered air stripper effluent water using granular activated carbon.
9. Discharge of treated water to Unnamed Ditch.

2.2.1 The SVE Process – SVE Trenches

The SVE process takes advantage of the volatility of the contaminants to allow the mass transfer of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) from adsorbed, dissolved, and free phases in the soil to the vapor phase, where it is removed under vacuum pressure. The basic operation for the ECC Site includes the extraction of air and water from the trench system. The SVE system dries any sand lenses within the zone of influence of the SVE system.[4] Contaminated moisture in the sand lenses is likely to be the principal mechanism by which contamination is transmitted to the trenches. The SVE system

[4] The zone of influence from the augmented SVE trench system will not reach contamination over the entire site, but should capture and destroy the most mobile contaminants located in closest proximity to Unnamed Ditch.

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is expected to remove that moisture. Free liquid entrained in the air will be removed by gravity in an entrainment separator. Periodically, water that accumulates in the entrainment separator will be pumped to an on-site storage tank for subsequent treatment, as needed, and then to an on-site discharge point in accordance with the substantive requirements of applicable federal and state laws as well as the Applicable or Relevant and Appropriate Requirements (ARARs). Vacuum pumps will also be used for the collection of contaminants via soil vapors. From the vacuum pumps, the collected vapor will pass through the existing carbon adsorption system, which consists of carbon columns connected in series.

Deleted: Appendix A contains a more detailed description of the on-site treatment system.

2.2.2 Augmented SVE Trenches [5]

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The augmented SVE trench system adds seven segments (i.e., Segments 1 through 7) to the existing SVE trench layout, each of varying length.[7] The proposed locations of the augmented SVE trench segments are shown on Figure 2. A short lateral for the south end of SVE trench Segment 5 extends into Hot Spot Area 2 and a short lateral from the western portion of Segment 6 extends into Hot Spot Areas 1 and 1A.

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Each of the augmented SVE trenches will be approximately 18 to 24 inches wide. The trenches will be situated to intercept permeable lenses in the till unit, above the sand and gravel unit. Riser pipes will be installed within each SVE trench to allow for initial removal of excess water, if necessary. The discharge pipes from the augmented SVE trench system will run aboveground to the existing ECC water treatment system.

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2.2.3 Pump Tests

Till water pump tests were performed on wells T-1, HS-1, and HS-2 between July 5, 2006 and August 4, 2006. The results of the tests were summarized in the August 2006 *Till Water Pump Testing Report*. This report concluded that there is no hydraulic connection between the till unit and the underlying sand and gravel unit in the northern and central portions of the Site (based on the results from T-1), on the south and southwest sides of the Site (based on the results from HS-1),

[5] The configuration presented herein does not represent a detailed or final design. Rather, the placement of the trenches has been presented to assist with the conceptual description of the intended construction theory. Final location of the augmented SVE trench system, to be approved by USEPA in consultation with IDEM, will be determined during the installation based on the field conditions.

[7] Configuration of the trench system may be modified based on field conditions, as approved by USEPA in consultation with IDEM.

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and in the southeast corner of the Site (based on the results from HS-2). Accordingly, the results of the till water extraction tests indicate that it will not be necessary to use SVE wells in place of Trench Segments 5 and 6; rather, SVE trenches can be installed and operated across the entire alignment of the proposed augmented SVE trench system.

2.2.4 SVE Trench Installation Methodology

The excavated soil will be tested to determine if it exceeds either the Acceptable Soil Concentrations as listed in Table Z-1-1[8] or if the Synthetic Precipitate Leaching Procedure (SPLP) exceeds the Acceptable Stream Concentrations as listed in Table Z-1-1. If the soils exceed the Acceptable Soil Concentrations as listed in Table Z-1-1, the soils will be treated on site to achieve the Acceptable Soil Concentrations as listed in Table Z-1-1. If the soils do not exceed the Acceptable Soil Concentrations as listed in Table Z-1-1 (either before or after on site treatment, if any) but the SPLP of the soils exceeds the Applicable Stream Concentrations as listed in Table Z-1-1, the soils will either be disposed of off site according to applicable USEPA and IDEM regulations and ARARs or placed beneath a 12-inch minimum vegetated soil cover of uncontaminated soils on the Northern or Central SVE Treatment Areas. If the soil does not exceed the Site-Specific Soil Exposure Concentrations and the SPLP analyses do not exceed the Applicable Stream Concentrations, the soils will be placed on the Northern or Central portions of the Site and vegetated, unless the Trustees elect to dispose of the soils off site according to applicable USEPA and IDEM regulations and ARARs. Details are presented in the February 2007 draft Design Report, to be reviewed and approved by USEPA, in consultation with IDEM, as provided in the Consent Decree. The SVE trenches will be installed utilizing excavation equipment and a biopolymer such as natural or synthetic guar gum. The approximate locations of the trenches are depicted on Figure 2. The excavations will be performed through the guar gum to prevent the trench walls from collapsing during the excavation and to reduce the potential of the lower sand and gravel unit from heaving at the bottom of the excavation.

The guar gum will be added to the trenches, as necessary, as the excavations proceed to maintain guar gum in the trench to within approximately two feet of the ground surface. Excavation spoils will be temporarily placed in staging areas

[8] The Acceptable Soil Concentrations reflect adjustments from Table 3-1 of Revised Exhibit A to the Consent Decree based on consideration of potential human exposure pathways at the Site as provided for in footnote 3 of Table Z-1-1 and Table Z-1-2.

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adjacent to the trenches. As the spoils are stockpiled, the guar gum will drain from the spoils and flow back into the excavation. Berms and/or silt fencing will be added along the Unnamed Ditch to preclude potential guar gum solids or excavation spoils from entering the Ditch. Upon completion of the trench excavation activities, all stockpiled excavation spoils will be placed within the former Southern Concrete Pad Area (SCPA).

The SVE trenches will be backfilled with gravel or similar granular material. The gravel backfill will be installed to within approximately two feet of the surface of each trench. As each trench is backfilled with gravel, a slotted four-inch-diameter horizontal PVC pipe (SVE pipe) will be installed in the trench. The optimum placement depth of the horizontal PVC pipe, within each trench segment, will be determined during the design phase. Measures necessary to avoid the potential fouling of the SVE pipe will also be addressed during the design phase.

The horizontal slotted pipe will be fabricated with solid vertical PVC access pipes installed at two locations on each of the seven excavation trenches. These vertical PVC access pipes will either be connected to the SVE system or will be capped and equipped with a vacuum gauge above the final grade of the trench. The multiple risers will be installed to allow the installation of additional equipment/instrumentation, if necessary, to monitor the effectiveness of the SVE system, and for the addition of enzymes necessary to dissolve the guar gum after completing each trench.

In addition, one four-inch-diameter PVC riser pipe will be installed within each trench while backfilling is performed. These dewatering wells will be installed at the low point of each trench and will be used for initial development and guar gum removal (see discussion below). Each PVC riser pipe will be equipped with sections of PVC screen, as appropriate, depending on the total depth of the trench at the respective location of the riser pipe. Solid PVC casing will extend from the screen to the ground surface.

After each trench is backfilled with gravel and the access pipes and the dewatering wells are installed, an appropriate enzyme will be added by the contractor to dissolve the guar gum. The enzyme will be pumped out of the trenches using the four-inch diameter dewatering wells. Guar gum displaced during the excavation or guar gum removed from the dewatering wells during the enzyme addition will be containerized and characterized. After assessment of the laboratory

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results to characterize that dissolution of the guar gum is complete, the water will, if necessary, be treated in the on-site treatment system and managed/disposed of in accordance with applicable standards and ARARs.

Additional soil will be removed at the surface of each trench to allow for the installation of a seal that will prevent vacuum leaks from the SVE trenches to the ground surface. A geomembrane liner will be installed at the base of this excavation over the gravel backfill in each trench and will be keyed into the surrounding soil. A geomembrane boot will be installed around each pipe penetration. The seal will then be backfilled with clay material and will be suitably compacted. The backfill may consist of the soils excavated to construct the seal.

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2.2.5 Thin Barrier Curtain Wall

The results of testing performed during November 1998 indicate that sand lenses within the till unit near Unnamed Ditch may be hydraulically connected to Unnamed Ditch. In response, the modified Additional Work includes the construction of a thin barrier curtain wall along the east, south, and southwest sides of the ECC Site, adjacent to the augmented SVE trench system (see Figure 2). This will eliminate, *inter alias*, any connection between sand lenses in the till unit and Unnamed Ditch, thus significantly decreasing the volume of water being removed and treated and cutting off a potential source of contamination to the Ditch. The thin barrier curtain wall installation was completed on June 2, 2006.

The piezometers that will be used to monitor the effectiveness of the thin barrier curtain wall were installed between June 5, 2006 and June 23, 2006. The locations of the piezometers are shown on Figure 2.

Deleted: After the seal is completed, a protective casing will be installed over the top of each PVC riser pipe. Excavations will be performed through the seal at each riser pipe location for the installation of the protective casing. A geotextile will be placed around the PVC riser for each well, across the pea gravel backfill in each excavation. Bentonite or grout will be placed over the geotextile and the base of the remaining portion of the excavation to seal the casing and to prevent leaks to the surface from the SVE trench. The protective casing will then be installed and the annular space around the casing will be backfilled and compacted as appropriate to maintain the integrity of the seal. Either hydraulic cement or silicon caulk will be used within the protective casing to seal the riser pipe from the well and the casing. An appropriate well cap will be installed to prevent vacuum leaks through the protective casing. A vacuum gauge will either be installed through the well cap or through the riser pipe in the casing. The surface of the protective casing will be installed approximately three inches above the surrounding grade to prevent water from ponding on the surface.¶
¶

2.3 Well Installation

Construction related activities at the ECC Site during 1998 and 1999 may have damaged monitoring well S-4A. As a result, a new well (S-4B) will be installed approximately 50 feet to the south (downgradient) of S-4A, in a low traffic area to be agreed on by the parties. The proposed location for S-4B is shown on Figure 3.

Deleted: The installation is summarized in the Slurry Systems, Inc. *Final Completion Report for Vibrated Beam Slurry Wall* dated September 2006, which is included in Appendix B.

Deleted: The *TBCW Piezometer Installation* letter report containing the installation details and installation logs was submitted on October 23, 2006.

Following the construction of the augmented SVE trench system, a new sand and gravel unit well (i.e., S-5) will be installed south of the southeast portion of the thin barrier curtain wall. The proposed location for S-5 is also shown on Figure 3. Installation and construction details for wells S-4B and S-5 are presented in the February

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2007 draft Design Report, to be reviewed and approved by USEPA, in consultation with IDEM, as provided in the Consent Decree.

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2.4 Permeable Reactive Gate System

A PRGS will be installed during the SVE trench construction and will be activated once the Soil Vapor Standards have been achieved in the augmented SVE trench system. The PRGS is intended to act as a backup system, which will prevent the build-up of till water on the upgradient side of the thin barrier curtain wall and will treat till water that is allowed to leave this area.[9]

The PRGS will utilize zero-valent granular iron to degrade chlorinated compounds to inorganic chloride and dehalogenated organic compounds. This system is appropriate for the ECC Site compounds of concern (COCs) since this treatment technology has been demonstrated during numerous bench scale studies, pilot studies, and full-scale remediation projects for various chlorinated compounds in ground water and wastewater. The reaction mechanism for the degradation of chlorinated compounds with zero-valent iron has been the mostly widely studied to date. Based upon recent research, the predominant degradation pathways are expected to consist of: (1) oxidation of the iron due to the presence of dissolved oxygen (DO) in ground water entering the treatment system creating hydroxyl radicals that degrade the chlorinated compounds; and (2) further degradation of chlorinated compounds during reducing reactions with iron, a strong reducing agent, through electron transfer. The chlorinated compounds are degraded to inorganic chloride, ethene and ethane, partially dechlorinated byproducts (e.g., 1,2-dichloroethene; 1,1-dichloroethene; and vinyl chloride) and small-chained hydrocarbons (e.g., methane and propane). Treatment of these partially dechlorinated byproducts is achieved by the same reducing reactions with iron by providing sufficient retention time in the treatment system.

The PRGS will utilize the augmented SVE trench system to collect and convey till water to a treatment vessel containing iron filings. The discharge from the treatment vessel will flow by gravity through pipe penetrations in the thin barrier curtain wall to a discharge point at Unnamed Ditch. During operation, the PRGS will be inspected on a quarterly or annual basis as specified in the February 2007 draft Design Report, to be

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[9] Due to the presence of the cap on the northern portion of the Site and the presence of the low-permeability soils used for backfill in the southern portion of the Site, very little till water is expected to build-up along the upgradient side of the adjacent thin barrier curtain wall.

[11] The usefulness of the existing vapor analyzer was assessed during the design phase. An initial correlation will be developed between the in-line analyzer results and samples sent off site for analysis. A detailed schedule and methodology for the vapor sampling is presented in the February 2007 draft Design Report, to be reviewed and approved by USEPA, in consultation with IDEM, as provided in the Consent Decree.

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reviewed and approved by USEPA, in consultation with IDEM, as provided in the Consent decree. If inspection of the PRGS indicates bypass, blockage or other conditions that could restrict or inhibit its performance, the PRGS will be repaired/reconditioned in accordance with a plan approved by USEPA in consultation with IDEM. Further details regarding the PRGS are presented within the February 2007 draft Design Report, to be reviewed and approved by USEPA, in consultation with IDEM, as provided in the Consent Decree.

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3.0 ACTIVE PHASE

3.1 Augmented SVE Trench System Vapor Removal

The augmented SVE trench system will be designed to achieve the Soil Vapor Standards listed in Table Z-1-3 and described in Section 3.2 below. The time required to attain the Soil Vapor Standards is dependent upon the adequate removal of water, the initial concentrations of the COCs, the minimization of short-circuiting, operating air flow rate and temperature, and the efficient diffusion of air through the soil pores. Based upon the previous SVE activities conducted at the Site, the attainment of shutdown standards is expected to occur within 3 to 6 months of operation of the dual-phase extraction systems in the augmented SVE trench system. However, the actual time may be longer or shorter.

3.1.1 Sample Collection Frequency and Methodology

The augmented SVE trench system will be installed to permit vapor samples to be collected from each individual SVE trench and from the combined vapor stream from all operating SVE trenches. Vapor samples will be collected in accordance with the sample methodology previously agreed to by the USEPA and IDEM and referenced in the final Design Report. The vapor from each individual SVE trench will be sampled daily (except weekends) during the first week of operation, weekly for the following 4 weeks, and biweekly thereafter. The collected vapor samples will be analyzed for total organics using an existing in-line Series 8800 Continuous Analyzer and/or an off-site laboratory[11] and for the VOCs and SVOC presented in Section 3.2 below using USEPA Method TO-15 (VOCs and SVOCs) and USEPA Method TO-13A (phenols) under a USEPA-approved Quality Assurance Project Plan (QAPP). Also, the vapor flow rate will be monitored and recorded to provide sufficient data to calculate the mass of organics removed from the soils and the effectiveness of the system. The collected vapor sample data will be used by the Trustees or their contractor to determine how best to utilize and apportion the SVE energy among the SVE trenches. USEPA and IDEM will receive advance notice of the temporary suspension of operation of any trench or trenches. Final shutdown of any trench or trenches must be approved by USEPA in consultation with IDEM.

Deleted: , as presented in Section 6 of the Revised Remedial Action Field Sampling Plan (FSP); Revision 4 dated April 28, 1997, as well as the modifications to the sampling plan as presented in the October 31, 2000 letter to USEPA and IDEM. These documents are attached as Appendix C

3.1.2 Augmented SVE Trench System Shutdown Methodology

When the vapor concentrations in all SVE trenches are less than the Soil Vapor Standards, the restart spike method on the vapor flow from each individual trench will be used to demonstrate that the vapor standards have been achieved.

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The restart spike procedure will include shutting down the entire trench vapor extraction system for a period of 21 days. Prior to such shutdown, authorization will be obtained from USEPA in consultation with IDEM. On restarting the vapor extraction system, all SVE trenches will be operated as during normal operations for approximately 30 minutes prior to sampling. The vapor extraction system will then be shut down again so that sampling can be performed under static, non-extraction conditions. After purging the sampling tubing, a sample of soil vapor will be collected from each of the individual SVE well risers into individual Summa canisters. The sampling period for each canister will be 15 to 30 minutes. If a sample from any of the trenches exceeds the vapor standards, the SVE of that trench will be reactivated for a period of at least one week, and the shutdown process described above will again be implemented.

When results of analyses of each of the individual trench well head soil vapor sample collected from two consecutive restart spikes conducted two weeks apart show that concentrations of each COC meet the Soil Vapor Standards described in Section 3.2, a water sample will be collected from the PRGS collection manhole. If the water sample meets the Acceptable Stream Concentrations presented in Table Z-1-1, then operation of the SVE system will be terminated subject to any restart required under Section 4.0, Item 1. If the water sample does not meet the Acceptable Stream Concentrations, then operation of the SVE system will continue for an additional 90 days before resampling the trench water. If no water is available in the PRGS collection manhole, then operation of the SVE system will be terminated when the restart spike tests meet the Soil Vapor Standards.

3.2 Soil Vapor Standards

The Soil Vapor Standards shown in Table Z-1-3 will be used, as described in the previous section, to determine shutdown of the augmented of SVE system. Reductions to the Table Z-1-3 list may be proposed to USEPA and IDEM following the completion of the weekly vapor sampling events.

3.3 Surface Water Monitoring

During operation of the augmented SVE trench system, the surface water within the Unnamed Ditch will be monitored on a semiannual basis. The surface water samples will be collected upstream and downstream of the ECC Site and at the Northside Landfill

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discharge location within Unnamed Ditch, as depicted on Figure 3. Additional samples may be collected at the discretion of the ECC Site Trustees.

Surface water samples will be collected as described in Section 6 of the Revised Remedial Action FSP; Revision 4 dated April 28, 1997. The surface water samples will be analyzed for compounds with Acceptable Stream Concentrations (Table Z-1-1) using USEPA Methods 8260B and 8270C.[12] If surface water is not encountered, the specific sampling event will be considered complete despite the inability to gather a full set of data.

3.4 Subsurface Water Monitoring

During operation of the augmented SVE trench system, the subsurface water within the augmented trench system and wells S-1, S-4B, and S-5 will be monitored on a semiannual basis. Wells S-1, S-4B, and S-5 are depicted on Figure 3. Additional samples may be collected at the discretion of the ECC Site Trustees.

Subsurface water samples will be collected from the wells as described in Section 6 of the Revised Remedial Action FSP, Revision 4, dated April 28, 1997, with modifications outlined in the Low Flow Ground Water Sampling letter dated November 10, 2000. The sampling procedure for the combined trench water sample is presented within the February 2007 draft Design Report, to be reviewed and approved by USEPA, in consultation with IDEM, as provided in the Consent Decree.

The subsurface water samples will be analyzed for compounds with Acceptable Stream Concentrations (Table Z-1-1) using USEPA Methods 8260B and 8270C. If subsurface water is not encountered in a trench, the specific sampling event for that trench will be considered complete despite the inability to gather a full set of data.

[12] The Acceptable Stream Concentrations reflect adjustments for background conditions as provided for in footnote 1 to Table Z-1-1.

[14] The control of back-venting and backflow from the PRGS into the trench system will be accomplished by valving.

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4.0 PHASE I MONITORING

The Phase I Monitoring period is a one year period beginning when the Soil Vapor Standards have been achieved in the augmented SVE trenches. Once the Soil Vapor Standards have been achieved, quarterly sampling and analysis of surface and subsurface water will be conducted during the Phase I Monitoring period.

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The water level within the augmented SVE trench system will be maintained using the PRGS. Control of the water level within the trench system will control the hydraulic gradient within the till unit across the Site, to prevent the flow of till water around or below the augmented SVE system.

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The PRGS will utilize the augmented SVE trench system to collect and convey till water to a treatment vessel containing zero-valent granular iron filings. The PRGS location, design and installation methodology are presented within the February 2007 draft Design Report, to be reviewed and approved by USEPA, in consultation with IDEM, as provided in the Consent Decree.

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Five performance criteria for the Phase I Monitoring have been determined. The actions to be taken in response to each of the performance criteria are different. The performance criteria and their respective proposed response actions are as follows:

1. If the quarterly water samples collected from the augmented SVE trench system contain VOCs at concentrations greater than Acceptable Stream Concentrations (Table Z-1-1), then a valve to the PRGS will be closed and the augmented SVE system will be reactivated[14] until the vapor meets the Soil Vapor Standards in Table Z-1-3. If the SVE system is restarted, the Phase I Monitoring period will also restart unless otherwise agreed to by USEPA and IDEM.

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2. If the quarterly monitoring events, using the water levels collected from the thin barrier curtain wall piezometers show that till water is flowing around the augmented SVE system, then the necessary adjustments will be made to the PRGS as approved by USEPA in consultation with IDEM.

3. If the quarterly water samples collected immediately downgradient from the Site, from Unnamed Ditch, contain VOCs at concentrations greater than the Acceptable Stream Concentrations (Table Z-1-1), then the source of these compounds will be investigated and further remediation will be evaluated. If

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determined to be necessary by the Trustees or by USEPA in consultation with IDEM, a proposal for further remediation will be submitted for approval by USEPA in consultation with IDEM.

4. The quarterly water level measurements to be collected from the thin barrier curtain wall piezometers will be used to confirm the integrity of the thin barrier curtain wall. If the thin barrier curtain wall is found to be leaking, then the wall will be repaired under a plan approved by USEPA in consultation with IDEM.

5. If quarterly sampling of sand and gravel monitoring wells S-1, S-4B, or S-5 show increasing trends in VOC concentrations that are above Acceptable Stream Concentrations (Table Z-1-1), then the cause of the trends will be evaluated and a report submitted for approval by USEPA, in consultation with IDEM, that evaluates the trends and proposes additional remedial actions (if necessary).

During Phase I Monitoring, the Site will be evaluated for surface re-use that is protective of the cap, the subsurface water treatment system (including the PRGS), and otherwise protective of human health and the environment. At the completion of the Phase I Monitoring, Phase II Long-Term Monitoring will begin at the Site, and the SVE treatment plant and its associated above ground storage tanks and underground piping may be removed (subject to whether they are needed in connection with water treatment at an adjacent site – Third Site).

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5.0 PHASE II LONG-TERM MONITORING

The Phase II Long-Term Monitoring will follow the completion of Phase I Monitoring and will be divided into Phase II(a) and Phase II(b). The PRGS will continue to allow a treated outlet for any subsurface water that accumulates within the till on the Site, thus preventing the flow of till water around the thin barrier curtain wall.

Phase II(a) Long-Term Monitoring will last for 2 years and follow the same sampling schedule as used in Phase I Monitoring. In the event that quarterly subsurface water samples collected from the augmented SVE trench system contain VOCs at concentrations greater than Acceptable Stream Concentrations (Table Z-1-1), then a valve to the PRGS will be closed and the SVE trench system will be reactivated using skid mounted SVE treatment (or the on-site treatment system if the on-site plant has been temporarily retained) until the trench vapor meets the Soil Vapor Standards in Table Z-1-3. Once the SVE trench system returns to Table Z-1-3 vapor standards, the use of the skid mounted system (or the on-site system) may be discontinued and any skid mounted equipment removed. The PRGS system valve will be reopened and the Phase II(a) monitoring period will restart. The quarterly water level measurements from the thin barrier curtain wall piezometers will also continue during the Phase II(a) Monitoring period to confirm the integrity of the thin barrier curtain wall. If the thin barrier curtain wall is found to be leaking, then the thin barrier curtain wall will be repaired under a plan approved by USEPA in consultation with IDEM.

After successful completion of the above described 2-year Phase II(a) Monitoring period, the remainder of the Phase II Long-Term Monitoring [Phase II(b)] will commence. The Phase II(b) Monitoring includes maintenance of the PRGS system and monitoring of the PRGS effluent on an annual basis. If inspection of the PRGS indicates bypass, blockage or other conditions that could restrict or inhibit its performance, the PRGS will be repaired and/or reconditioned in accordance with a plan approved by USEPA, in consultation with IDEM. If the PRGS effluent exceeds the Effluent Limits in Table Z-1-4, the PRGS "bed" will be replaced.

If the fresh PRGS bed cannot meet the required standards, additional measures to meet the standards will be evaluated and the PRGS monitoring frequency may be temporarily increased to quarterly. Phase II(b) Long-Term Monitoring will continue on a quarterly schedule until USEPA agrees, in consultation with IDEM, that annual sampling may be resumed or the USEPA approves cessation of monitoring.

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During the Phase II Long-Term Monitoring, the Site final cover and any applicable access restrictions will be maintained unless EPA agrees otherwise.

The determination of whether the Site poses an unacceptable risk to human health and the environment, and therefore if continued Phase II Long-Term Monitoring is warranted or additional measures may be necessary, should be determined as part of the five-year reviews provided for under 42 USC 9621(c) based on the PRGS monitoring data. Additional measures shall be taken if, based on the five year review or other new information, USEPA determines (in consultation with IDEM) that the modified Additional Work described in this Attachment Z-1 is not successfully protecting Unnamed Ditch from the discharge of contamination above the Effluent Standards in Table Z-1-4.

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6.0 SCHEDULE

A schedule for the modified Additional Work is presented on Table Z-1-5.

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TABLE Z-1-1

Site-Specific Acceptable Concentrations
Enviro-Chem Superfund Site
Zionsville, Indiana

Parameter	Acceptable Stream Concentration [1, 2] (ug/L)	Acceptable Soil Concentration [3, 4] (ug/kg)
Volatile Organic Compounds		
Acetone		370,000
1,1-Dichloroethene		42,000
1,2-Dichloroethene (total)	7.4 SB	5,800
Ethylbenzene	3,280	160,000
Methylene chloride	15.7	1,800
Methyl ethyl ketone		250,000
Methyl isobutyl ketone		75,000
Tetrachloroethene	8.85	640
Toluene	3,400	240,000
1,1,1-Trichloroethane	5,280	280,000
1,1,2-Trichloroethane	41.8	300
Trichloroethene	80.7	82
Vinyl chloride	525	13
Xylenes (total)		170,000
Semi-Volatile Organic Compounds		
Bis (2-ethylhexyl) phthalate	50,000	
Di-n-butyl phthalate	154,000	
1,2-Dichlorobenzene	763	220,000
Diethyl phthalate	52,100	
Isophorone		
Naphthalene	620	
Phenol	570	160,000
Inorganics		
Antimony		
Arsenic	9.2 SB	
Barium		
Beryllium		
Cadmium		
Chromium VI	77.6 SB	
Lead	19.8 SB	
Manganese		
Nickel	100	
Silver		
Tin		
Vanadium		
Zinc	123 SB	
Cyanide (total)	17.2 SB	
Polychlorinated biphenyls		
Aroclor 1016	0.5 SB	
Aroclor 1221	0.9 SB	
Aroclor 1232	0.5 SB	
Aroclor 1242	0.5 SB	
Aroclor 1248	0.5 SB	
Aroclor 1254	0.5 SB	
Aroclor 1260	0.5 SB	

TABLE Z-1-1

Site-Specific Acceptable Concentrations
Enviro-Chem Superfund Site
Zionsville, Indiana

Notes:

[1] SB = Applicable Surface Water Background Concentrations were defined as two standard deviations above the calculated mean of 12 sample sets of background surface water samples. Background surface water samples were collected from the surface water sample location SW-1 (see Appendix A for calculations).

For the purposes of Revised Attachment Z-1, if the methodology for surface water monitoring described in Sections 3.3 and 4.0 indicates background levels are elevated above the levels in Appendix A, the background levels and the corresponding values in Table Z-1-1 will be recalculated to adjust for such increased background.

[2] Stream Criteria, from Table 1 of the Record of Decision for the site, September 25, 1987 (or calculated on the same basis) unless otherwise noted.

[3] Acceptable Soil Concentrations are the minimum IDEM RISC non-default closure levels for commercial/industrial soil direct contact, commercial/industrial soil migration to groundwater, construction soils, and the soil saturation limit (see Table Z-1-2 for closure levels).

[4] The Acceptable Soil Concentrations, within the meaning of Revised Exhibit A and the Consent Decree, will be achieved when the arithmetic average of the soil sample results for each parameter, assigning all nondetect results a value of 1/2 the detection limit, do not exceed the values set forth in this table by more than 25%.

TABLE Z-1-2

Site-Specific Soil Exposure Calculations[1]
Enviro-Chem Superfund Site
Zionsville, Indiana

Parameter	Soil Saturation Limit C_{sat} (mg/kg)	Commercial/Industrial Soil Direct Contact		Commercial/Industrial Soil Migration to Groundwater		Construction Soils	
		Carcinogen C_{ssic} (mg/kg)	Non-carcinogen C_{ssin} (mg/kg)	Carcinogen C_{sbsic} (mg/kg)	Non-carcinogen C_{sbsin} (mg/kg)	Carcinogen C_{sscc} (mg/kg)	Non-carcinogen C_{sscn} (mg/kg)
Acetone	201,292	NE	13,987	NE	370	NE	72,936
1,1-Dichloroethene	930	NE	738	NE	42	NE	3,861
cis-1,2-Dichloroethene	1,001	NE	246	NE	5.8	NE	1,240
trans-1,2-Dichloroethene	2,138	NE	392	NE	14	NE	2,012
Ethylbenzene	160	NE	9,129	NE	195	NE	36,644
Methylene chloride	3,008	355	12,472	1.8	28	35,203	36,962
Methyl ethyl ketone	28,194	NE	119,270	NE	250	NE	360,827
Methyl isobutyl ketone	8,750	NE	31,537	NE	75	NE	65,900
Tetrachloroethene	115	40	214	0.64	12	4,258	1,093
Toluene	309	NE	3,174	NE	240	NE	16,531
1,1,1-Trichloroethane	642	NE	10,663	NE	280	NE	51,059
1,1,2-Trichloroethane	1,342	24	194	0.30	2.5	2,786	896
Trichloroethene	627	1.7	93	0.082	0.35	211	224
Vinyl chloride	928	4.8	262	0.013	2.1	319	1,064
Xylenes (total)	170	NE	1,242	NE	426	NE	6,724
1,2-Dichlorobenzene	220	NE	5,103	NE	265	NE	22,889
Phenol	21,329	NE	113,262	NE	160	NE	243,091

Legend:

C_{sat} = Soil Saturation Limit (IDEM RISC Technical Guide - Appendix I (January 1, 2004 update) Table C, Equation 7-3)

C_{ssic} = Commercial/Industrial Soil Closure Level for Direct Contact for Carcinogens (IDEM RISC Technical Guide - Appendix I (January 1, 2004 update) Table C, Equation A1-9)

C_{ssin} = Commercial/Industrial Soil Closure Level for Direct Contact for Non-Carcinogens (IDEM RISC Technical Guide - Appendix I (January 1, 2004 update) Table C, Equation A1-10)

C_{sbsic} = Commercial/Industrial Migration to Ground Water Contact Closure Level for Carcinogens (IDEM RISC Technical Guide - Appendix I (January 1, 2004 update) Table C, Equation A1-11)

C_{sbsin} = Commercial/Industrial Migration to Ground Water Contact Closure Level for Non-Carcinogens (IDEM RISC Technical Guide - Appendix I (January 1, 2004 update) Table C, Equation A1-12)

C_{sscc} = Construction Soil Closure Level for Carcinogens (IDEM RISC Technical Guide - Appendix I (January 1, 2004 update) Table C, Equation A1-13)

C_{sscn} = Construction Soil Closure Level for Non-Carcinogens (IDEM RISC Technical Guide - Appendix I (January 1, 2004 update) Table C, Equation A1-14)

NE = Not established

Notes:

[1] The closure levels were calculated in accordance with the procedures in the IDEM RISC Technical Guide - Appendix I (January 1, 2004 update) Tables C, D, and F. Specifically, the equations that were used are listed in Table C, the default equation parameters/exposure assumptions that were used are listed in Table D, and the human health toxicity parameters that were used are listed in Table F. Copies of these tables are included in the Design Report.

TABLE Z-1-3

Soil Vapor Standards
Enviro-Chem Superfund Site
Zionsville, Indiana

Compound	Soil Vapor Standard	
	(mg/L)	(ppmv)
Volatile Organics (VOCs):		
Acetone		244
1,1-Dichloroethene	2	481
1,2-Dichloroethene (total)	3.7	880
Ethylbenzene	37	8,076
Methylene chloride	0.08	22
Methyl ethyl ketone	0.04	13
Methyl isobutyl ketone	0.69	159
Tetrachloroethene	0.11	16
Toluene	107	27,090
1,1,1-Trichloroethane	8.3	1,442
1,1,2-Trichloroethane	0.01	1
Trichloroethene	0.39	68
Vinyl chloride	919.2	338,808
Total Xylenes	595	130,244
Base Neutral/Acid Organics:		
1,2-Dichlorobenzene	9.3	1,466
Phenol	0.005	1.3

TABLE Z-1-4

Effluent Limits for Discharge of Treated Water to Unnamed Ditch[1]
Enviro-Chem Superfund Site
Zionsville, Indiana

Contaminant of Concern (COC)	Discharge Limit (ug/l)
1,1-Dichloroethane	990 [2]
1,1-Dichloroethene	2
Cis -1, 2-Dichloroethene	2
Trans-1, 2-Dichloroethene	2
Tetrachloroethene	5
1,1,1-Trichloroethane	200
1,1,2-Trichloroethane	42
Trichloroethene	10
Vinyl Chloride	10
bis(2-Ethylhexyl)phthalate	0.68
Di-n-butylphthalate	0.021
Diethylphthalate	7
1, 2-Dichlorobenzene	0.76
Naphthalene	0.069
Phenol	0.57

ug/l = micrograms per liter

[1] Effluent limits from February 1997 *Briefing Memo: Environmental Conservation and Chemical Zionsville, Indiana Superfund Site, ARAR Effluent Limits* , prepared by George Oliver, IDEM Office of Water Management.

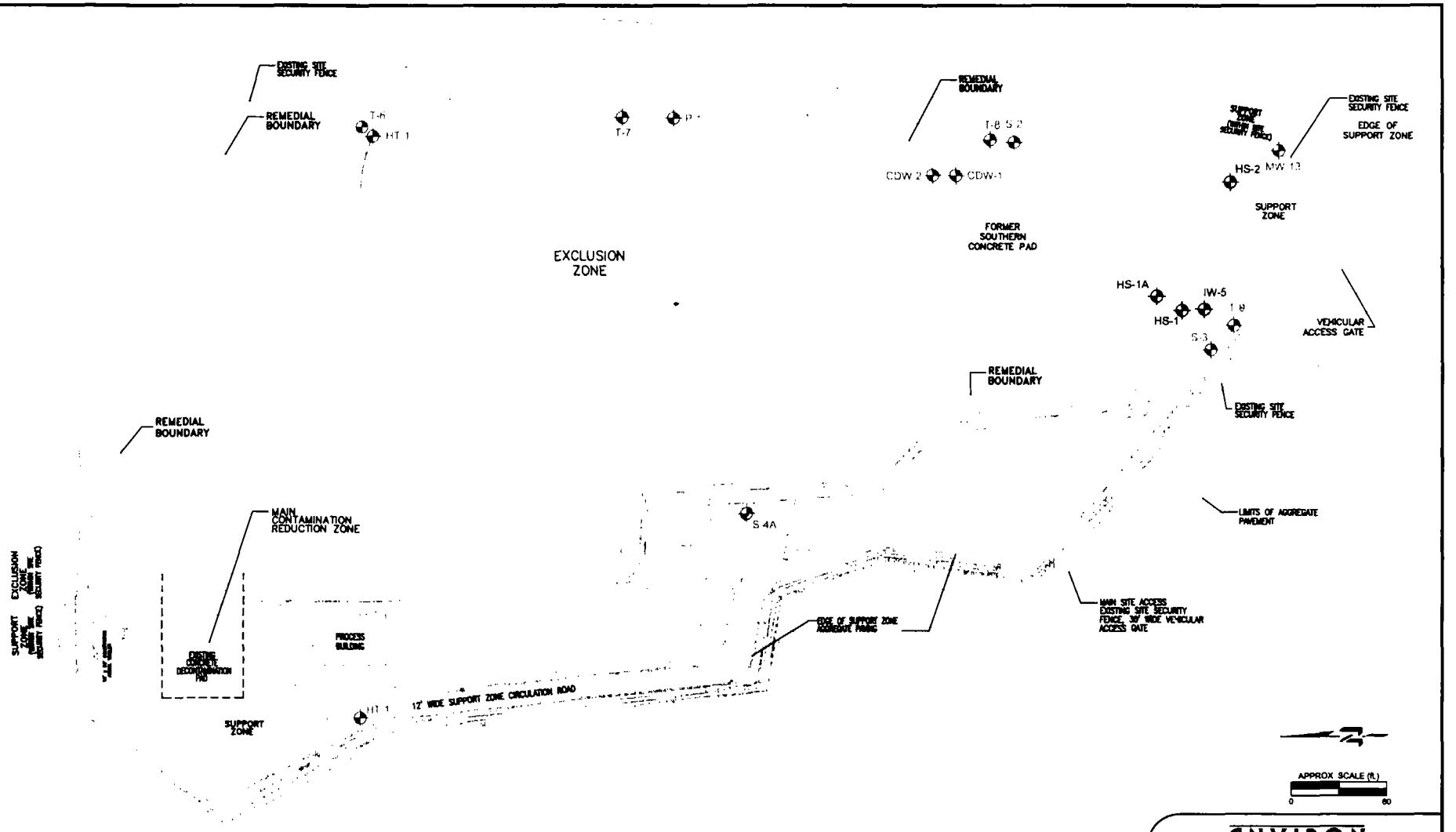
[2] Effluent limits not set forth in IDEM Briefing Memo. Value represents IDEM Tier 1 Default Ground Water Residential Criterion.

TABLE Z-1-5

Preliminary Schedule
Enviro-Chem Superfund Site
Zionsville, Indiana

1	**Thin Barrier Curtain Wall & Till Water Pump Tests**	
	(a) Design Report for Thin Barrier Curtain Wall and Till Water Pump Tests.	Completed September 23, 2005.
	(c) Installation of Thin Barrier Curtain Wall.	Completed June 2, 2006.
	(d) Completion of Till Water Pump Tests.	Completed August 4, 2006
2	**Augmented SVE Trench System**	
	(a) Design Report for the Attachment Z-1 Remedy.	Rev 1. Submitted February 2007.
	(b) Incorporation of Agency Comments.	60 days after receipt.
	Mobilization for Construction	60 days after Final Design Approval.
	(c) Augmented SVE Trenches.	9 Months after mobiliization (Weather Permitting).
3	**Construction Completion Report**	
	(a) Draft Completion Report to Agency.	60 Days from completion of construction.
	(b) Incorporation of Agency Comments.	30 Days from receipt of Agency comments.
4	**Phase I Monitoring**	Duration 1 Year from Achievement of Soil Vapor Standards in the Augmented SVE Trench System as described in Section 4.0.
5	**Phase II Long-Term Monitoring**	After completion of Phase I Monitoring as described in Section 5.0.

FIGURES



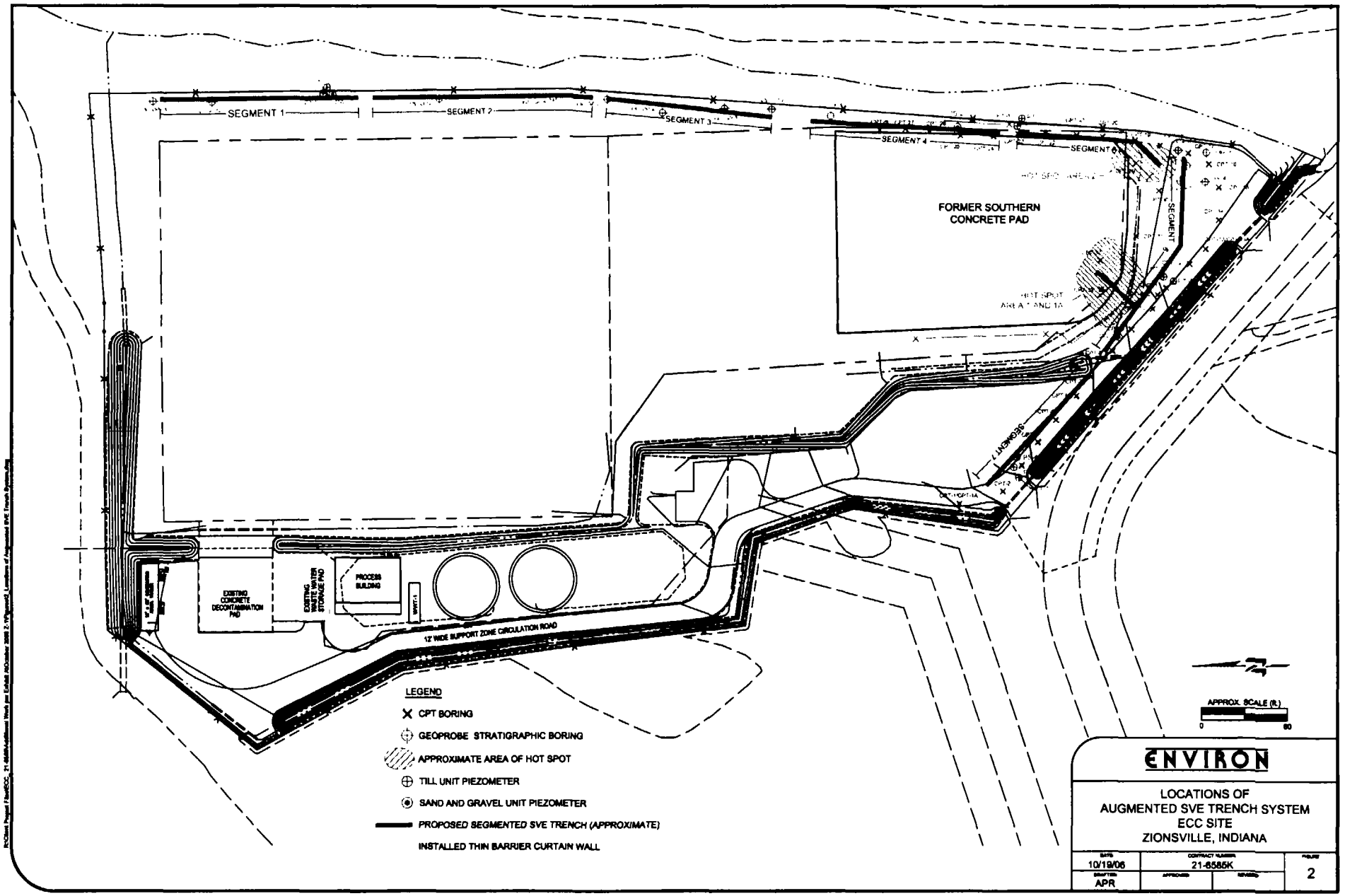
LEGEND

- WELLS TO BE ABANDONED PRIOR TO CONSTRUCTION OF AUGMENTED SVE TRENCH SYSTEM
- WELLS ABANDONED IN SEPTEMBER 2005

ENVIRON

WELLS TO BE ABANDONED
ECC SITE
ZIONSVILLE, INDIANA

DATE	CONTRACT NUMBER		FIGURE
10/19/06	21-6585K		1
DRAFTER: APR	APPROVED	REVISED	



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LOCATIONS OF
AUGMENTED SVE TRENCH SYSTEM
ECC SITE
ZIONSVILLE, INDIANA

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10/19/06	21-6585K	2
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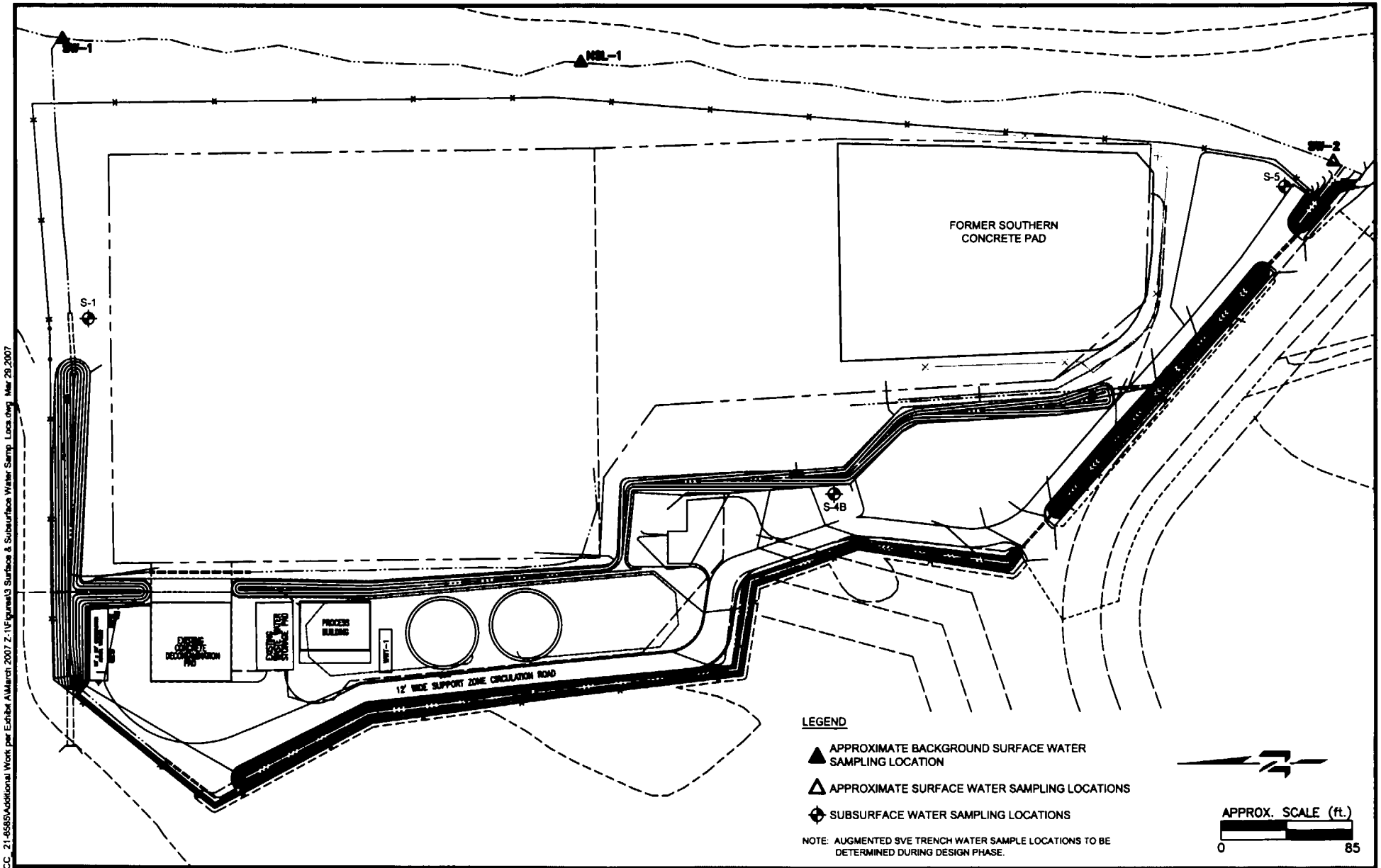

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740 Waukegan Road, Suite 401, Deerfield, IL 60015

Surface and Subsurface Water Sampling Locations
ECC Site
Zionsville, Indiana

Figure

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Drafter:	APR	Date:	8/26/03	Contract Number:	21-6585B	Approved:	SCH	Revised:

APPENDIX A

Statistical Evaluation of Background Conditions

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Thin Barrier Curtain Wall¶
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APPENDIX C¶
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Sampling Plans¶
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APPENDIX D¶
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IDEM RISC Default Equations and Parameters¶
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APPENDIX E¶
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TABLE A-1

Analytical Results and Calculations
for Background Surface Water Samples
Enviro-Chem Superfund Site
Zionsville, Indiana

SAMPLE LOCATION	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1		ONE	TWO
ENVIRON SAMPLE ID	ECSW1-01	SW1-981207	ECSW1-02	SW1-990315	SW1-990415	ECSW1-03	SW1-990603	SW1-990614	SW1-990630	SW1-990714	SW1-000210	SW1-000309	MEAN	STANDARD	STANDARD
COLLECTION DATE	11/11/1998	12/7/1998	2/17/1999	3/15/1999	4/15/1999	5/13/1999	6/3/1999	6/14/1999	6/30/1999	7/14/1999	2/10/2000	3/9/2000	CONCENTRATION	DEVIATION	DEVIATIONS
COMMENTS[1]					DUPLICATE		DUPLICATE	DUPLICATE	DUPLICATE	DUPLICATE	DUPLICATE	DUPLICATE		OF MEAN	ABOVE MEAN
Volatile Organic Compounds															
1,2-Dichloroethene (total)	0.25	0.25	0 25	0.25	0.25	0.25	0.25	0.25	0.25	11	0.25	0.25	1.1	3.1	7.4
Ethylbenzene	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.5	0.25	0.25	0.25	0.27	0.1	0.42
Methylene Chloride	0.25	0.25	0.25	0.25	0.75	1	0.25	0.95	0.25	0.25	3	0 25	0 64	0.8	2.2
Tetrachloroethene	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	4	0.25	0 25	0.56	1.1	2.7
Toluene	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.6	0 25	0.225	0.28	0.1	0.48
1,1,1-Trichloroethane	0.25	0.25	0.25	0 25	0.25	0.25	0.25	0.25	0.25	6.5	0.25	0.25	0.77	1.8	4.4
1,1,2-Trichloroethane	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0.25
Trichloroethene	0.25	0 25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	14	0.25	0.25	1.4	4.0	9.3
Vinyl Chloride	0 25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0.25
Semivolatile Organic Compounds															
Bis (2-ethylhexyl) phthalate	5	5	1	4.5	5	5	5	5	5	5	4.75	4.75	4.6	1.1	6 9
1,2-Dichlorobenzene	5	5	5	4 5	5	5	5	5	5	5	4.75	4.75	4.9	0.2	5.2
Diethyl Phthalate	5	5	5	4.5	5	5	5	5	5	5	4.75	4.75	4.9	0.2	5.2
Di-n-butyl phthalate	5	5	5	4 5	5	5	5	5	5	5	4.75	4.75	4.9	0.2	5.2
Naphthalene	5	5	5	4.5	5	5	5	5	5	5	4.75	4.75	4.9	0.2	5 2
Phenol	5	5	5	4 5	5	5	5	5	5	5	4.75	4.75	4 9	0.2	5.2
Polychlorinated biphenyls															
Aroclor 1016	0.5	0.48	0.24	0.235	0.25	0.25	0.25	0.245	0.245	0.25	0.2425	0 25	0.3	0.1	0 5
Aroclor 1221	1	0.95	0.485	0.47	0.5	0.5	0.5	0.4875	0.4875	0.5	0.4825	0.5	0.6	0.2	0.9
Aroclor 1232	0.5	0.48	0.24	0 235	0 25	0.25	0.25	0.245	0.245	0 25	0.2425	0.25	0.3	0 1	0 5
Aroclor 1242	0.5	0.48	0.24	0 235	0 25	0.25	0.25	0.245	0 245	0 25	0.2425	0.25	0.3	0 1	0.5
Aroclor 1248	0.5	0.48	0.24	0.235	0.25	0.25	0.25	0.245	0 245	0.25	0.2425	0.25	0 3	0.1	0.5
Aroclor 1254	0.5	0 48	0 24	0.235	0.25	0.25	0.25	0.245	0.245	0.25	0.2425	0.25	0.3	0.1	0.5
Aroclor 1260	0.5	0 48	0.24	0.235	0.25	0.25	0 25	0.245	0.245	0.25	0.2425	0.25	0.3	0 1	0.5
Inorganic Parameters															
Arsenic	0.85	1.9	0.7	0.7	11.8	2.9	3	3.35	0.8	5.3	2 9	0.8	2.9	3.1	9.2
Cyanide (Total)	5	5	5	3.85	2.35	10 3	21 425	8 85	2.35	1 4	2.425	0.45	5.7	5.7	17
Chromium VI	5	5	5	5	5	5	5	5	5	5	114	15 7	15	31	78
Lead	0.35	0.35	1.6	2.4	29.15	0.5	0.5	1.6	0.5	0.5	4.15	0.5	3.5	8.2	20
Nickel	7 95	27.9	8.2	18	56.75	20.5	3.75	20.4	14.25	11.55	19.85	18 6	19	14	46
Zinc	0.75	11 2	3 8	27.8	175.9	14.2	4.1	18.65	6.15	29.65	23.3	0.25	26	48	123

Notes:

[1] Concentrations for duplicate samples were averaged.

Concentrations in blue are actual detected values.

Concentrations in black are equivalent to one-half of the laboratory reported detection limit.

TABLE A-2

Applicable Surface Water Background Concentrations
Enviro-Chem Superfund Site
Zionsville, Indiana

Parameter	Acceptable Stream Concentration [1] (ug/L)	Applicable Surface Water Background Concentrations [2] (ug/L)	Applicable Surface Water Background Concentrations Exceeding The Acceptable Stream Concentrations (ug/L)
Volatile Organic Compounds			
1,2-Dichloroethene (total)	1.85	7.4	7.4
Ethylbenzene	3,280	0.4	
Methylene Chloride	15.7	2.2	
Tetrachloroethene	8.85	2.7	
Toluene	3,400	0.5	
1,1,1-Trichloroethane	5,280	4.4	
1,1,2-Trichloroethane	41.8	0.3	
Trichloroethene	80.7	9.3	
Vinyl Chloride	525	0.3	
Semivolatile Organic Compounds			
Bis (2-ethylhexyl) Phthalate	50,000	6.9	
Di-n-butyl Phthalate	154,000	5.2	
1,2-Dichlorobenzene	763	5.2	
Diethyl Phthalate	52,100	5.2	
Naphthalene	620	5.2	
Phenol	570	5.2	
Inorganic Parameters			
Arsenic	0.0175	9.2	9.2
Chromium VI	11	77.6	77.6
Lead	10	19.8	19.8
Nickel	100	46.3	
Zinc	47	123	123
Cyanide (total)	5.2	17.2	17.2
Polychlorinated biphenyls			
Aroclor 1016	0.000079	0.5	0.5
Aroclor 1221	0.000079	0.9	0.9
Aroclor 1232	0.000079	0.5	0.5
Aroclor 1242	0.000079	0.5	0.5
Aroclor 1248	0.000079	0.5	0.5
Aroclor 1254	0.000079	0.5	0.5
Aroclor 1260	0.000079	0.5	0.5

Notes:

[1] Acceptable Stream Concentrations as presented in Revised Exhibit A, Table 3-1.

[2] Applicable Surface Water Background Concentrations are defined as two standard deviations above the calculated mean of the 12 background sample sets. (*i.e.*, Applicable Background Concentrations = Mean + (Standard Deviation * 2))

Thomas Krueger/R5/USEPA/US

05/30/2007 02:16 PM

To

Subject ECC Attachment Z-1

Matt,

In addition to Hill's 5/9 comments, I have the following comments/questions on the redlined version:

Page 1, fn. 1 -- Is it true that excess water does not occur at all? Or is it just not at levels that cause problems?

Page 5, Section 2.2.2, line 2 -- Could "proposed" be changed to "general" to allow for flexibility in the design/field?

Page 5, fn. 7 -- Is it helpful to retain the details on what sort of field conditions would justify modifications?

Page 6, Section 2.2.4 -- Is it appropriate to remove the off-site disposal option? Would that flexibility be helpful? Is it appropriate to remove references to the RUSLE?

Page 6, fn. 8 -- Have we agreed to these changes?

Page 7 -- Are the changes from pipes to wells OK? Also the number of locations and trenches?

Page 8 -- Are the changes in the last paragraph of 2.2.4 ok?

Page 11, Section 3.1.1 -- reference to the Design Report should include the language", as approved by USEPA in consultation with IDEM"

Pages 11-12, Section 3.1.2 -- Are these changes ok?

Page 14, paragraph (3) -- I prefer leaving it as one sentence rather than splitting it into two -- it's all connected.

Page 16, second paragraph -- Are these changes ok?

Page 16, fourth paragraph -- Remove "temporarily"

Page 17, last line -- Are these standards the correct ones?